in contradistinction to the metallurgical, manufactures carried out in the electric furnace, viz. the making of calcium carbide, the synthesis of nitrogen compounds from the atmosphere, and the ammonia oxidation process. In the section on the synthesis of nitrogen compounds it is stated that the world's production of calcium cyanamide during 1918 was estimated to be more than three-quarters of a million tons, of which nearly one-third of a million tons was made in Germany.

In sections 10 to 16 and section 18 an account is given of the use of the electric furnace for the production of metals, alloys, and refractories. The importance of these operations is shown by the fact that, in 1918, 100,000 tons of pig-iron were produced in Sweden in the electric furnace, while during the previous year one and a quarter million tons of electric steel ingots and castings were manufactured in the United States. The section dealing with the manufacture of aluminium is disappointingly short in view of the importance of this metal, about 100,000 tons of which are produced annually at the present time solely by means of the electric furnace.

Attention must be directed to a curious misstatement in this part of the book. It is said (p. 294) that in the electrical smelting of zinc there is a tendency to the formation of a grey powder "due to rapid cooling, whereby the metal passes direct from the vapour to the solid condition, the boiling-point of the metal being only slightly removed from the melting-point." Actually, the boiling-point of zinc, at atmospheric pressure, is more than 900° C., while its melting-point is 418° C. Further, the use of the word "matte" on p. 168 for the metallic product from an iron-making blast-furnace appears to be undesirable.

The remaining sections of the book deal with miscellaneous furnaces, electrolytic processes, and questions of design and power supply.

The book will doubtless be a very valuable addition to the library of the metallurgist and electrical engineer, and it is to be hoped that a second edition will be called for soon, partly to enable the numerous misprints to be corrected. To select a few at random: p. 37, "Electrical connection . . . are conveniently made"; p. 87, an *x* is evidently omitted from the formula; p. 290, the word "downward" appears to be displaced, presumably from the line above; p. 269, "a Belgian Compant . . ." should doubtless read "a Belgian Company . ." Furthermore, if the author were to take to heart the dictum reiterated by Rickard in his invaluable book on "Technical Writing" and remember the reader, the demand for a second edition would give him an opportunity of rewriting some of his sentences, particularly the following: "Currents up to 6000 amps. can be lead up to the furnace walls, along two heavy bars for single phase, and three for two or three phase and connected by flexible cables to the electrodes." Or, "According to Prof. J. W. Richards, pig-iron was, in 1920, being produced in Sweden in electric furnaces from charcoal at a cost of 5 dollars per ton less than their own blast-furnace pig-iron."

J. L. H.

Chemistry after the War.

(1) *A Dictionary of Applied Chemistry.* By Sir Edward Thorpe. Assisted by eminent contributors. Vol. 1, *A–Calcium.* Revised and enlarged edition. Pp. x+752. (London: Longmans, Green, and Co., 1921.) 60*s.* net.

(2) *A Text-book of Electro-chemistry.* By Prof. Max le Blanc. Translated from the fourth enlarged German edition by Dr. Willis R. Whitney and Dr. John W. Brown. Pp. xiv+338. (New York: The Macmillan Co. London: Macmillan and Co., Ltd., 1920.) 18*s.* net.

(3) *Thermodynamics and Chemistry.* By Prof. F. H. MacDougall. Pp. v+391. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1921.) 30*s.* net.

(1) IT was almost inevitable that, when the distractions caused by the war had diminished somewhat, there should be a call for a new edition of Thorpe's Dictionary. Whilst pure chemistry may have made comparatively little progress during the war, applied chemistry has received a very great stimulus during the period that has elapsed since the former edition appeared in 1912. The first volume of the new edition has expanded from 614 to 752 pages, or rather more than one-fifth, and whilst it is difficult, without a careful comparison with the old edition, to discover where the expansion has taken place, it is easy to see that the most striking developments are adequately described in the new volume, so far as they are covered by the section from "A" to "calcium." Thus under "acetic acid" and "aldehyde" the manufacture from acetylene is described; under "amatol" there is a forward reference to an article on explosives which will appear in a later volume, and a brief account is given of the new methods used

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to prepare ammonium nitrate on a large scale. The synthetic processes for the production of ammonia are described very briefly in a single column, but this is in accord with the classification of the former edition, where a full description of these processes is reserved for a later article under "nitrogen." The revision, as a whole, has been well done, and the new edition can be commended heartily as an accurate presentation of the state of applied chemistry after the vicissitudes of recent years.

(2) The publishers of le Blanc's "Text-book of Electro-chemistry" have adopted a simpler method of meeting the demand for a new edition. Although the title-page is dated 1920, the translator's preface bears no date. No references later than 1907 have been discovered by the reviewer, and the table of equivalents is certainly more than ten years old. In view of the rapid growth of the science of electro-chemistry, further comment is scarcely necessary.

(3) Prof. MacDougall's book contains an attractive and lucid account of the principal applications of thermodynamics to chemistry. The author writes as a chemist rather than as a mathematician, and, instead of giving merely an occasional numerical illustration of his equations and formulæ, has provided quantitative data even when these are scarcely needed to elucidate the text. Thus it is a pleasure to find a full list of specific heats of the solid elements, a table of the heat-capacities of gases and of the ratio of their specific heats at different temperatures, as well as useful tables of the heats of formation of metallic and non-metallic compounds and of heats of solution, combustion, and neutralisation. In the same way the later chapters contain useful tables of electrode-potentials, equivalent conductances, ionisation-coefficients, transference numbers, and ionic conductances. In dealing with the phase rule, one chapter only is devoted to theoretical considerations, whilst three chapters are required to cover the various examples which the author has selected to illustrate the applications of the rule. Another valuable feature of the book is the insertion at the end of each chapter of a large number of problems. These are of a very practical character, and illustrate clearly the many ways in which a knowledge of thermodynamics may be made use of in the study of chemical problems. Certainly no book with which the reviewer is acquainted presents the subject in a manner more likely to prove attractive to the chemist.

T. M. L.

Prices and Wages.

Prices and Wages: An Investigation of the Dynamic Forces in Social Economics. By P. Wallis and A. Wallis. Pp. xii + 456. (London: P. S. King and Son, Ltd., 1921.) 25*s.* net.

THE authors of this volume are, it may be gathered from the preface, business men without much literary experience. The consequent defects of the book, it is to be feared, render it unlikely that many readers will be found with sufficient patience to attempt the whole. Four hundred and fifty pages of reasoning and criticism are at the best a heavy task; when the reasoning is often obscure and unnecessarily verbose, when the criticism seems often ill-informed or based on misunderstanding, the task is apt to become almost unendurable.

The argument appears to be as follows: (1) The value of the net annual production, per head of persons engaged in the industry, for any one commodity, tends to fluctuate in the same way as for any other commodity; this agreement is much closer than for prices. (2) These fluctuations in the value of net annual production are due to fluctuations in the value of the money standard. (3) The value of the net annual production per head, at any one time, tends to be nearly the same for all commodities, including the money standard. (4) Wages and salaries tend approximately to the same proportion of the net annual production per head. (5) It follows from (3) and (4) that the annual wage-rate in any industry tends to be equivalent to the *net* annual production of gold per head for the same grade of labour in the gold-mining industry. (6) The approximately constant proportion of wages and salaries to total net annual product is due to the competition of unemployed labour; the maintenance of this pool of unemployment is the real failure of capitalism.

It should have been obvious even to unpractised writers that ordinary terms should not be employed in senses widely divergent from common usage. This rule has not been followed. The value of the net annual production per head of any commodity is spoken of throughout as its "normal price," with the result that the argument falls at times—for the reader if not for the authors also—into the most hopeless confusion. The reader comes across some phrase about "normal commodity prices"—dissents from it—passes on—and only perhaps some time later when wearied with an argument that seems to him nonsense may it occur to him that the authors did not mean normal prices at all, in the ordinary

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